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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/056,179	01/22/2002	Theodore M. Taylor	MI22-1824	9467

21567 7590 05/20/2003

WELLS ST. JOHN ROBERTS GREGORY & MATKIN P.S.
601 W. FIRST AVENUE
SUITE 1300
SPOKANE, WA 99201-3828

EXAMINER

WEISS, HOWARD

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 05/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	10/056,179		TAYLOR, THEODORE M.	
	Examiner		Art Unit	
	Howard Weiss		2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 70-84 ~~is~~ are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 70-84 ~~is~~ are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

Attorney's Docket Number: MI22-1824

Filing Date: 1/22/02

Continuing Data: RCE established 3/11/02

Claimed Foreign Priority Date: none

Applicant(s): Taylor

Examiner: Howard Weiss

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/11/02 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 70 to 72, 75, 77 to 82 and 84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori et al. (U.S. Patent Application No. 2002/0093073) and Sakakibara et al. (U.S. Patent Application No. 2002/0000603).

Mori et al. show most aspects of the instant invention (e.g. Figure 11C) including:

- a semiconductive substrate **1**
- a pair of STI masses **125, 126** with first portions within the substrate and second portions projecting outwardly from the substrate

- said first portions having opposing sides orientated normal to the surface of said substrate and defining an active area
- said second portions having opposing said orientated perpendicular to said surface, displaced laterally relative to the opposing sides of said first portions so as to define a step surface said step aligned with said sides of said first portion and having the other features as claimed
- a first dielectric layer **32** made of silicon oxide and received over the active area
- a floating gate **42,58** with a concave upper surface and which does not fill the region between the second portion's opposing sides
- a second dielectric layer **6** made of either silicon oxide or ONO and a control gate **7**

Mori et al. does not show the first dielectric layer received over the step surface and explicitly made of ONO. Sakakibara et al. teach (e.g. Figure 2a) to extend a first dielectric **41** over a STI mass **30** to restrict production of seams (Page 4 Paragraph 0045). It would have been obvious to a person of ordinary skill in the art at the time of invention to extend a first dielectric **41** over a STI mass as taught by Sakakibara et al. in the device of Mori et al. to restrict production of seams. In reference to the first dielectric being made of silicon oxide instead of ONO, Mori ~~et al.~~ teach (e.g. Page 9 Paragraph 0118) that ONO is an equivalent material known in the art. Therefore, it would have been obvious for one of ordinary skill in the art to substitute ONO for silicon dioxide for the first dielectric layer material.

4. Claims 73 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori et al. and Sakakibara et al., as applied to Claim 70 above, and in further view of Ding et al. (U.S. Patent No. 6,214,667).

Mori et al. and Sakakibara et al. show most aspects of the instant invention (Paragraph 3) except for a floating gate **222a** with a concave upper surface and which fills the region between the second portions of the STI masses. Ding et al.

teach (e.g. Figure 2F) to have a floating gate **222a** with a concave upper surface and which fills the region between the second portions of STI masses **216a** to minimize cell size and increase device integration (Column 1 Lines 54 to 57). It would have been obvious to a person of ordinary skill in the art at the time of invention to have a floating gate with a concave upper surface and which fills the region between the second portions of STI masses as taught by Ding et al. in the device of Mori et al. and Sakakibara et al. to minimize cell size and increase device integration.

5. Claims 74 and 83 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori et al. and Sakakibara et al., as applied to Claim 70 above, and in further view of Shirai et al. (IEDM 1995).

Mori et al. and Sakakibara et al. show most aspects of the instant invention (Paragraph 3) except for the rugged outermost surface of said floating gate being made of hemispherical grain polysilicon (HSG Poly-Si). Shirai et al. teach (e.g. see Abstract) to roughen up the outer surface of a floating gate using HSG Poly-Si to increase the capacitive-coupling ration of the memory cell. It would have been obvious to a person of ordinary skill in the art at the time of invention to roughen up the outer surface of a floating gate using HSG Poly-Si as taught by Shirai et al. in the device of Hsieh et al. to increase the capacitive-coupling ration of the memory cell.

Response to Arguments

6. Applicant's arguments with respect to Claims 70 to 84 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November

Art Unit: 2814

1989). The Art Unit 2814 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications. The official TC2800 Before-Final, **(703) 872-9318**, and After-Final, **(703) 872-9319**, Fax numbers will provide the fax sender with an auto-reply fax verifying receipt of their fax by the USPTO.

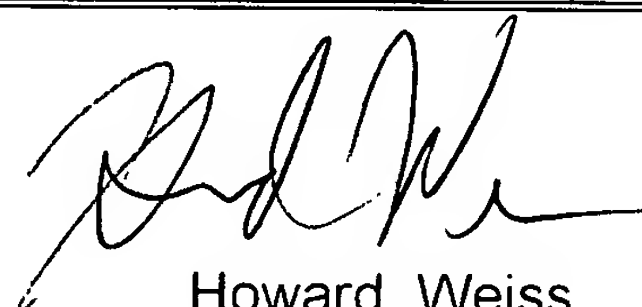
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(703) 308-4840** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 Receptionist at **(703) 308-0956**.

9. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/317, 510	thru 5/9/03
Other Documentation: none	
Electronic Database(s): EAST	thru 5/9/03

HW/hw
9 May 2003



Howard Weiss
Examiner
Art Unit 2814